suggestions for the better prosecution of his professional labours.

But to discover in nature any mechanical operation which may be suggestive of some effectual method whereby to prevent the emission of smoke from furnaces, needs no previous study, or abstract investigation of things remote from our common experience. For healthful purposes each one of us is provided by nature with an apparatus whose chief office seems to be that of freeing the air we breathe from all palpable impurities therein suspended. To preserve from injury—

"Those tender cells that draw the vital air,"

is perhaps the main utility of the nose. Although physiologists describe it merely as the seat of the sense of smell, its wondrous adaptation to the purpose of which we speak is most obvious. "The extent of the cavities belonging to the nose is much increased by their communicating with various other sinuses or cavities in the neighbouring bones. All those cavities, together with the sinuses with which they communicate, are lined with a sensible and delicate mucous membrane." The air, instead of passing directly into the lungs without impediment, enters the distended nostrils, and being carried onward by the act of inspiration, is made to impinge upon the walls of those crooked passages, which, being lined with an adhesive mucus, firmly retain all particles of soot or dust, and other extraneous matter, thus brought in contact with them. This important agency of the nose is most remarkable in foggy weather, when, if the air be inhaled through the mouth, a painful sense of oppression at the chest will be distinctly felt; but if drawn through the nose, with the mouth closed, the pain and discomfort directly cease, by reason of the cleansing process thence ensuing. Here, then, we have presented to our notice an apparatus, expressly designed by an all-wise Creator to effect a result precisely similar to that which we propose to ourselves—an exact model of the thing of which we are in search—perfect in action and simple in construction. Can it be imitated? We think it can. Between the flue and the chimney of a furnace, let there be interposed some contrivance analogous to the nasal organ, and the emission of smoke will be assuredly prevented by its retention there, if not by its consumption. So far, in a general view, the matter appears quite practicable; the only difficulty lies in the construction of that part of the apparatus representing the lining of the nose. In the living model the secretion of mucus is, at all times, proportionate to the quantity of foreign matter contained in the air, because on that depends the degree of irritation or excitation of the mucous membrane, without which it remains dormant. We may not hope to imitate so perfect a contrivance in all its details, nor may we expect to succeed in producing a machine which, like the nose, shall instinctively detect the presence of unduly large particles of matter, and on the instant dislodge them by a convulsive movement analogous to sneezing. But for the mere interception of soot in its passage from a furnace, such structural refinement and perfect action are unneeded. All that we require for the accomplishment of that object, is a hollow vessel formed in its interior after the fashion of the nasal sinuses, and constructed either of some porous material, or of metal, minutely pierced, so that water, or some other fluid, might constantly enter from an exterior reservoir, in imitation of the mucous secretion.

There is every reason to believe that such an arrangement would be found perfectly efficient in retaining the sooty particles of smoke; moreover the first cost would not be considerable, while the expense of supplying the apparatus with water would be scarcely appreciable, especially where a steam-engine existed, and might be wholly counterbalanced by the sale of the deposited soot, for manuring or other purposes.

The apparatus might be modified by the application of an air pump, to draw the smoke and gases through water, so that the gross particles of soot would become saturated with the fluid, and remain behind, the gases alone escaping into the atmosphere.* The working of the pump would require a very small expenditure of power as will be presently shown. According to Tredgold, "we may state the quantity of air and smoke in round numbers, for coal and coke, at 2,000 cubic feet, for each cubic foot of water converted into steam." Supposing a 14-horse engine to require the evaporation of one quarter of a cubic foot of water per minute,—according to that computation we should require a pump capable of pumping 500 cubic feet of air per minute, that is to say, if working at the rate of 30 revolutions per minute, about 18 inches in diameter, and 5 feet stroke. To draw that quantity of air through water 2 inches deep, would be tantamount to raising 500 cubic feet of water 2 inches high per minute, or 5,208 lbs., one foot high per minute. Allowing the friction of the pump to absorb about the same amount of power, [illegible]= about one-third of a horse power required to overcome the total resistance.

But the utility of such a contrivance as that last described, in preventing the emission of smoke from chimneys, would be little in comparison with its probable value as a means of neutralising the poisonous products evolved in many manufacturing operations. In the second report of the Health of Towns' Commissioners, it is justly said, that "too much importance has hitherto been attached to the mere influence of lofty chimneys in removing to a distance and diluting the noxious fumes which many manufactories evolve. In themselves, they in no way destroy the emanations which are conveyed into them,—these are discharged as much as before into the external atmosphere; and experience has proved that even very lofty chimneys, on which large sums have been expended, do not necessarily insure that amount of admixture with the common air which is essential to prevent the most injurious consequences on their deposition, even at very considerable distances.

By the use of chemical solutions, instead of water, as the fluid medium, it appears to us that an air-pump, so applied, would be found a most efficient substitute for the chimney, as a means of preventing the vitiation of the atmosphere by nauseous, acrid, and other noxious fumes from manufactories. As far as the engineer is enabled to judge, however, such a result is merely conjectural; by suitable structural arrangements and mechanical appliances he may contrive to collect the deleterious gases, rapidly as they are evolved, and force them into one general current, but it is for the chemist to determine whether, by the interposition of any chemical solution or compound between the extremities of that channel, we may hope to fix or destroy the contaminating elements, and thus prevent their escape into the atmosphere.

The subjects to which this paper relates are obviously of very great importance to the community at large, and if the practical utility of the suggestions here made for the prevention of atmospheric contamination should be confirmed by actual experiment, they might prove, perhaps, of material assistance to Government in its earnest endeavours to improve the sanitary condition of the country.

* The Hookah pipe is an exemplification of our meaning.

RESTORATION OF GLOUCESTER CATHEDRAL.—The dean and chapter have made a beginning. The west front of this magnificent cathedral is undergoing restoration, and we heartily hope that the good work thus commenced will steadily go on. Something, too, has been done in the choir. A stone pulpit has been erected on the north side, in the room of the wooden pulpit which occupied the centre; and it is whispered that the unsightly pews are to be swept away and replaced by kneelings fronting the east, in conformity with the style of the choir. The *Gloucester Chronicle* says,—"Some months ago we threw out a suggestion for the removal of the modern screen, which injures the effect of the glorious east window and hides the Lady Chapel, and we sincerely trust that this necessary work will be undertaken sooner or later. Let *the choir*, at all events, be put in perfect condition. The restoration of Gloucester Cathedral would be a vast work; but when we look at what has been achieved in the neighbouring diocese of Hereford—what has been done at Wells—we do not despair."

ON BRICKWORK,

MORE ESPECIALLY WITH REFERENCE TO ITS APPLICABILITY TO MODERN DECORATIVE ARCHITECTURE.*

In all ages and countries—even in a barbarous state—man has had sufficient common sense to satisfy his wants with the materials with which nature has provided him; and enveloped, as he has been, in beauty and its ever-bursting seeds, he has cultivated the soil around, to give vigour and durability to their growth.

Wherever a geological position gave dignity to the building *material*,—where the Pentelican rocks reflected the golden and mellow hues of the Athenian sky,—upon *that* were their ideas of beauty stamped,—their historical chapter of the world's civilization charactered; but, wherever the floods have washed, or the freshening rivers divided the land, and formed alluvial soil, the *brick* structure is seen upon its confines—a monument to man's ingenuity and nature's bounty is mirrored in the waters. It was so in walled Babylon, in buried Pompeii, in Thebes "of the hundred gates;" and do we not see around us sufficient reason for its more general adoption, in decorative architecture, in our own land,—

"This sparkling stone,
Set in a silver sea."

In Rome, where man's genius was made visible in the magnificence of nature, the offspring of Tiber and of earth was made no inferior decoration to the city; and each nation that fell back dismayed before the Roman eagle, and the bright swords o'er which it towered, failed not to gather the art-fruits that blossomed on this natural soil, in the footsteps of the mighty Julius.

The most essential properties of a building material are strength and durability, for without these it is unworthy to enshrine an artist's thought, which, like all intellectual creations—

"Yields proof
That it is born for immortality."

To demonstrate the strength of bricks I quote a few memoranda of experiments conducted at the works of Messrs. Cubitt, and reported in THE BUILDER.

"A place brick, faced with plaster, yielded to 11, and crushed with 16½ tons.

A good stock yielded to 30, and fell to pieces under 34 tons.

A superior washed stock yielded to 36, and was crushed by 44½ tons.

A pressed and kiln burnt stock, made for superior purposes, ground on both sides to get a true bed, *bore a pressure of* 60 *tons* (the limit of the power of the ram used), *and was taken out sound and uninjured.* A similar brick, *not* ground, but faced with plaster, resisted the same pressure without crushing, but was slightly broken at the edges."

By the result of experiments added in the report, on three pieces of Caen stone of the size of a brick, viz., 9 × 4½ × 3, we find that the first, which had the bed parallel with the end, and at right angles with the pressing surfaces, was cracked by 30 tons (not in the line of bed) and crushed by 39 tons. The second block, with the bed parallel with the vertical face, and at right angles to the pressing surfaces, stood 42 tons before it crushed; and the third, with the bed parallel with the pressing surfaces, was slightly cracked by 40 tons, but stood 50½ tons before it crushed.

These figures require no comment: they speak plainly, and forcibly declare that it is not on the ground of strength that brick can be objected to. But, it may be said, there is a difference between the strength of a *single* brick and that of a mass where it is used with others in conjunction with mortar or cement: in support of this view, the recent failure at the Euston-square station may be instanced. To this, I would answer that where good cement is used the objection is removed; for we find, that when the separation of a mass of brickwork has been attempted, as in the Babylonian ruins, the *bricks* have often given way, and the cement has remained unimpaired. With respect to the columns mentioned, the bricks in that case neither gave way nor were crushed. The accident was attributed (if I recollect rightly) by Professor Hosking to the

* Read at the Architectural Association, Lyon's-Inn Hall, Strand, July 7, 1849.